

REMARKS

I. Preliminary Remarks Regarding The Amendment

The foregoing amendment is in the revised amendment format as provided in 1267 OG 106. Accordingly, the provisions of 37 C.F.R. § 1.21, requiring submission of clean and marked-up versions of the replacement paragraphs and claims, are waived. A clean copy of the pending claims after entry of the amendment is attached hereto as Appendix A as a convenience to the Examiner.

The Applicants do not intend by any amendments to abandon the subject matter of any claim previously presented. The Applicants reserve the right to pursue the subject matter of such claims during prosecution of this or subsequent applications. Claims 1-26 are currently pending and stand rejected. Claims 1-4, 6, 11- 12, 17-18, 20-23, and 26 are amended and claim 5 is canceled herein. Thus, claims 1-4 and 6-26 will be pending upon entry of the present amendment.

II. Amendment

In the Specification

In the specification, the Applicants have removed the inadvertent recitations of information not essential to a description of the invention. The amendment does not include new matter.

In the Claims

Support for the amended language of the claims is found throughout the specification. More specifically, the amendment to claim 1 is supported at page 7, line 19 to page 8, line 1. Support for the amended language of claim 2 is found at page 7, lines 19-23. The amended language of claims 3 and 4 finds support at page 13, line 24 to page 14, line 15. Support for the amended language of claim 6 is found at page 14, lines 16-26. The amended language of claim 11 finds support at page 8, lines 1-7. Support for the amended language of claim 12 is found at page 8, lines 5-7. Support for the amended language of claims 20 and 21 may be found at page 16, line 25 to page 17, line 3; page 31, Table 2; Example 8 beginning on page 45, line 10; and page 46a, Table 6. The amended language of claim 22 finds support at page

17, line 31 to page 21, line 3. Finally, support for the amended language of claims 23 and 26 is found at page 8, lines 18-26. None of the amendments include new matter.

III. Patentability Arguments

A. The Anticipation Rejections under 35 U.S.C. § 102 May Properly Be Withdrawn.

1. Claim 1

Claim 1 was rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,374,627. In support of the rejection, the Examiner asserted that the '627 patent disclosed a method comprising contacting a living plant or plant part with an effective amount of acetic acid and allowing the effective amount to protect or prevent plant diseases. The Examiner further asserted that such a method would be reasonably expected to demonstrate improved production of biologically active compounds. The Applicants respectfully traverse the rejection.

The Examiner does not assert, and the '627 patent does not expressly or inherently disclose, a step of recovering a compound from a plant or plant part, as expressly recited in claim 1. For that reason alone, the Applicants respectfully submit that the Examiner has not established a *prima facie* case of anticipation of the subject matter of claim 1 by U.S. Patent No. 5,374,627, and the rejection should be withdrawn.

Beyond the preceding dispositive remarks, the Applicants note that the '627 patent is drawn to methods of protecting plants from agricultural pests. Nowhere in the '627 patent, in the knowledge in the art, or in scientific reasoning, is there a basis for asserting that an "effective" amount of a compound, such as acetic acid, for protecting plants from agricultural pests is the same amount as would be "effective" in improving the production of a compound having therapeutic activity. Thus, the Examiner has not established that the '627 patent discloses, expressly or inherently, the step of contacting a living, intact plant or plant part with an amount of acetic acid "effective" to improve the production of a therapeutic compound from the plant or plant part as recited in claim 1.

For the foregoing reasons, the Applicants submit that the rejection of claim 1 under 35 U.S.C. § 102(b) over U.S. Patent No. 5,374,627 has been overcome and the rejection may properly be withdrawn.

2. Claims 1-5, 8, 10, 22, 23, and 26

Claims 1-5, 8, 10, 22, 23, and 26 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,407,816. In support, the Examiner asserted that the '816 patent discloses methods of treating a living plant or plant part with acetic acid, with the method comprising active steps that are identical to the claimed methods. In response, the Applicants respectfully traverse.

The '816 patent does not disclose, expressly or inherently, the step of contacting a living plant or plant part with acetic acid. Rather, the '816 patent discloses the production and recovery of taxol and taxanes by cell cultures of *Taxus* species. See U.S. Patent No. 5,407,816, abstract. Further, the Summary of the '816 patent reveals that the '816 patent discloses an invention drawn to cell culture methodology. See '816 patent, col. 3, line 56 to col. 4, line 44. In contrast, the pending claims are drawn to a living, intact plant or plant part being contacted with acetic acid. The Applicants submit that the instant application does not contain a definition of the phrase "living, intact plant or plant part" that deviates from the ordinary and accustomed meaning of the terms contained therein such that an isolated cell is embraced by the phrase. Moreover, a construction of a "plant" or "plant part" that did embrace an isolated plant cell would be inconsistent with expressly stating in the claims that such biological material be both living and intact. A construction that gives no meaning to a term expressly recited in a claim, such as "intact," is rarely correct, and is not correct here. Thus, U.S. Patent No. 5,407,816 is defective in failing to disclose or suggest contacting a living, intact plant or plant part with acetic acid. As a consequence, the Applicants submit that the Examiner has not established a *prima facie* case that the '816 patent anticipates the subject matter of any of the rejected claims under § 102(b).

For the foregoing reasons, the Applicants respectfully submit that the rejection of claims 1-5, 8, 10, 22, 23, and 26 under 35 U.S.C. § 102(b) over U.S. Patent No. 5,407,816 has been overcome and may properly be withdrawn.

B. The Obviousness Rejections under 35 U.S.C. § 103 May Properly Be Withdrawn.

1. Claims 1-5, 7-10, 22, 23, and 26

Claims 1-5, 7-10, 22, 23, and 26 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816 in view of U.S. Patent No. 5,620,875 and Staba.

In support of the rejection, the Examiner relied on U.S. Patent No. 5,407,816 as disclosing "a method for eliciting compounds having therapeutic activity by contacting living plant material with acetic acid to induce or to improve production of therapeutically active compounds." Office Action at page 10. The '816 patent is also characterized as disclosing that acetate and auxins are precursors and regulators of plant-derived therapeutically active compounds such as taxol and taxanes. *Id.*, at page 11. The Examiner further asserts that U.S. Patent No. 5,620,875 teaches that taxol and taxanes are produced from various plant parts, including plant cuttings that comprise roots and leaves. *Id.* Additionally, the Examiner characterized Staba as disclosing various plants as sources for a variety of therapeutically active compounds, including antitumor and antimicrobial compounds, and as disclosing that acetic acid derivatives and/or auxins are important plant growth regulators in general use.

In response, the Applicants traverse. The primary reference, U.S. Patent No. 5,407,816, does not disclose or suggest the step of contacting a living, intact plant or plant part with acetic acid. As noted in the abstract, the '816 patent discloses the production and recovery of taxol and taxanes by cell cultures of *Taxus* species. Consistent therewith, the Summary of the '816 patent identifies objects of the invention that are all drawn to cell culture methodology. See '816 patent, col. 3, line 56 to col. 4, line 44. The pending claims, in contrast, are drawn to contacting a living, intact plant or plant part with acetic acid. Applicants did not abandon the ordinary and accustomed meanings and re-define "plant" or "plant part" in a manner that would embrace an isolated plant cell. Consistent with that position is the claim phrase "living, intact plant or plant part." If a plant or plant part were an isolated plant cell, the term "intact" would be rendered superfluous, and therefore meaningless, because a plant cell must be intact to be living. Such a claim construction is rarely correct, and is not correct here. Thus, U.S. Patent No. 5,407,816 is defective in failing to disclose or suggest contacting a living, intact plant or plant part with acetic acid.

None of the secondary references cited by the Examiner remedy the defect in the '816 patent. U.S. Patent No. 5,620,875 discloses the extraction of spent culture from Yew tree cuttings with acetic acid, not contacting a living, intact plant or plant part with acetic acid.

Staba discloses the use of indole-3-acetic acid and naphthaleneacetic acid to promote callus production; Staba does not disclose the use of acetic acid and does not disclose its contact with a living, intact plant or plant part. Thus, neither the '875 patent nor Staba remedy the defect in the '816 patent, and Applicants respectfully submit that the Examiner has not established a *prima facie* case of obviousness for any of the pending claims in view of the cited references.

For the foregoing reasons, Applicants submit that the rejection of claims 1-5, 7-10, 22, 23, and 26 under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816 in view of U.S. Patent No. 5,620,875 and Staba has been overcome and may properly be withdrawn.

2. Claims 6 and 24

Claims 6 and 24 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816, in view of U.S. Patent No. 5,620,875, Staba, and U.S. Patent No. 4,871,574. In support of the rejection, the Examiner relied upon the characterizations of the '816 patent, the '875 patent, and Staba that were provided in support of the rejection of claims 1-5, 7-10, 22, 23, and 26 as obvious. As noted above, that reliance was misplaced. U.S. Patent No. 5,407,816 does not disclose or suggest contacting a living, intact plant or plant part with acetic acid, and neither U.S. Patent No. 5,620,875 nor Staba remedy that defect. In the instant rejection, the Examiner relies on U.S. Patent No. 4,871,574 for assertedly disclosing the step of macerating plant parts to recover therapeutically active compounds. Office Action at page 13. The '574 patent, however, does not disclose or suggest contacting a living, intact plant or plant part with acetic acid, and therefore fails to remedy the defect in the '816 patent. Thus, the Examiner has not established a *prima facie* case of obviousness for the subject matter of either claim 6 or claim 24.

For the foregoing reasons, the rejection of claims 6 and 24 under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816, in view of U.S. Patent No. 5,620,875, Staba, and U.S. Patent No. 4,871,574 has been overcome and may properly be withdrawn.

3. Claims 11-21 and 25

Claims 11-21 and 25 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816, in view of U.S. Patent No. 5,620,875, Staba, Stevens, and U.S. Patent No.

3,810,990. In support of the rejection, the Examiner relied upon the characterizations of the '816 patent, the '875 patent, and Staba that were provided in support of the rejection of claims 1-5, 7-10, 22, 23, and 26 as obvious. As noted above, that reliance was misplaced. U.S. Patent No. 5,407,816 fails to disclose or suggest contacting a living, intact plant or plant part with acetic acid, and neither U.S. Patent No. 5,620,875 nor Staba remedy that defect. In the instant rejection, the Examiner relies on Stevens as disclosing the extraction of flavonoid compounds, including quercetin, from leaf cuticular material. Office Action at page 15. In addition, the Examiner relies on the '990 patent as disclosing that flavonoid compounds have antimicrobial activity and as disclosing an assay for that activity. *Id.* Neither Stevens nor the '990 patent, however, discloses or suggests contacting a living, intact plant or plant part with acetic acid, and therefore each reference fails to remedy the defect in the '816 patent. Thus, the Examiner has not established a *prima facie* case of obviousness for the subject matter of any one of claims 11-21 or 25.

For the foregoing reasons, the rejection of claims 11-21 and 25 under 35 U.S.C. § 103(a) over U.S. Patent No. 5,407,816, in view of U.S. Patent No. 5,620,875, Staba, Stevens, and U.S. Patent No. 3,810,990 has been overcome and may properly be withdrawn.

C. The Indefiniteness Rejection of Claims 1-26 under 35 U.S.C. § 112, Second Paragraph, May Properly Be Withdrawn.

The Examiner rejected claims 1-26 under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness, for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Applicants address each basis for the rejection in the following enumerated paragraphs.

1. Claim 1

Claim 1 was rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness because the claimed method does not comprise any recovery step, because "a compound" of step b) does not appear to find an antecedent basis in the claim by virtue of the indefinite article "a," and because none of the characteristics of "a compound" of step b) are indicated in the method of claim 1. These bases for rejecting claim 1 under 35 U.S.C. § 112, second paragraph, have been rendered moot in view of the present amendment to claim 1. Accordingly, that the basis for the rejection of claim 1 has been overcome.

2. Claims 1 and 23

Claims 1 and 23 were rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness in reciting "effective amounts" because neither effects of acetic acid nor particular amounts of acetic acid are indicated in the claimed method. In response, Applicants submit that the elicitor is applied in an amount suitable for inducing production of a compound having therapeutic activity in the plant or plant parts. As used in the pending claims, the term "amount of acetic acid effective to induce the production of the compound" refers to an amount capable of inducing an activity, particularly an antibacterial, antifungal, or anticancer activity, in the subject plant or plant parts. Support in the specification for an "effective" amount of an elicitor is found at page 13, lines 17-20. Accordingly, the Applicants submit that this basis for rejecting claims 1 and 23 has been overcome without narrowing the scope of the claims.

3. Claim 1

With respect to the claim 1 and the asserted uncertainty as to whether "effective amounts" are different in order to "induce" or "improve" production of a compound of interest. Applicants submit that the amendment to claim 1 renders moot this basis for rejecting the claim. As defined in the specification, "to induce" production of a compound means "to initiate" or "to increase" production of such a compound. (Specification, page 3, lines 8-12.) Because increasing production is improving production, the amendment does not alter the scope of claim 1. Thus, the Applicants submit that this basis for rejecting claim 1 has been rendered moot without narrowing the scope of the claim.

4. Claims 1 and 23

The Examiner rejected claims 1 and 23 under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness, maintaining that it was unclear as to what was encompassed by the term "allowing." As used herein, the term "allowing" is a common term which would be known to one of skill in the art. The ordinary meaning of the word "allow" according to the Merriam-Webster Dictionary (and attached hereto in Appendix B) means "to permit." Nevertheless, the present amendment to claims 1 and 23 obviates the rejection without narrowing the scope of the claims. Accordingly, the Applicants submit that this basis for rejecting claims 1 and 23 has been overcome without narrowing the scope of these claims.

5. Claim 1

With respect to the claim 1, the Examiner asserted that it was unclear whether the same protocol was used to induce or improve production of a compound. Although Applicants submit that original claim 1 did not suffer from indefiniteness in this regard, the instant amendment to claim 1 obviates this basis for the rejection without narrowing the scope thereof.

6. Claim 23

The Examiner rejected claim 23 for asserted uncertainty as to whether some differences or relationship between "compound" and "component" is intended and what it would be, if any. As used herein, the term "compound" may represent a chemical compound, a cuticular compound, a therapeutically active compound, a biologically active compound, lipid, wax, cutin, protein, a primary or secondary metabolite, and the like. There is support for this term throughout the specification, specifically at page 1, line 11 through page 3, line 5. Further support for the term "compound" is found throughout the specification (see, e.g., the Summary of Invention, beginning at page 3, and throughout the Detailed Description, beginning at page 11). The ordinary meaning of the term "compound" according to the Merriam-Webster Dictionary (and attached hereto in Appendix B) is "a distinct substance formed by chemical union of two or more ingredients in definite proportion by weight." The term "component" is a common term which would be known to one of skill in the art and may comprise a "part" of a plant or a cuticular coating and not necessarily be limited to a "compound." Support for the term "component" is found in the specification at page 45, lines 1-6. The ordinary meaning of the term "component," according to the Merriam-Webster Dictionary (and attached hereto in Appendix B), is "a constituent part." For example, a component could be a single ingredient of a compound. As such, Applicants submit that both terms, "compound" and "component" have unambiguous, clear, and definite meanings that are distinct. Accordingly, the Applicants submit that this basis for the rejection of claim 23 has been overcome.

7. Claims 2 and 26

Claims 2 and 26 were rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness because the Examiner maintained that the "%" symbol was unclear in defining the quantity of acetic acid by weight or volume. As amended herein, the term "%" is now clarified in the relevant claims as a unit of volume. Support is found in the specification, for example, at page 7, lines 22-23. The present amendment to claims 2 and 26 obviates the rejection without narrowing the scope of either claim.

8. Claim 3

Claim 3 was rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness because there was an assertedly insufficient antecedent basis for "the aqueous medium." Claim 3 depends from claim 1 and claim 1 has been amended to provide proper antecedent basis for "the aqueous medium." Thus, Applicants submit that this basis for the rejection of claim 3 has been rendered moot by amendment.

9. Claims 4 and 5

Claims 4 and 5 were rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness regarding the limitation "an aqueous medium" because it was uncertain as to whether some differences were intended. Claim 4 depends from claim 1 and claim 1 has been amended to provide proper antecedent basis for "the aqueous medium." The cancellation of claim 5 obviates the rejection of claim 5 for improper antecedent basis.

The Examiner also asserted that it was uncertain as to what differences were intended between "exuding" and "extracting," particularly in view of "extracting" being construed to include "macerating" (claim 5). The Applicants contend that the term "exude," as known to one of skill in the art and as defined in the Merriam-Webster Dictionary (and attached hereto in Appendix B), means "to ooze out," whereas the term "extract," as known to one of skill in the art and as defined in the Merriam-Webster Dictionary (and attached hereto in Appendix B), means "to withdraw by physical or chemical process; or, to treat with a solvent so as to remove a soluble substance." Additionally, the term "macerate," as known to one of skill in the art and as defined in the Merriam-Webster Dictionary (and attached hereto in Appendix B), means "to cause to become soft or separated into constituent elements by or as if by

steeping in fluid." By definition, "extracting" is a mechanical or chemical process, and "macerating" is one means by which the "extracting" can be carried out. Accordingly, the Applicants submit that the basis for the rejection of claims 4 and 5 has been overcome.

10. Claim 10

Claim 10 was rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness because of an assertedly insufficient antecedent basis for "compounds recovered from the aqueous medium." The present amendment to claim 1, from which claim 10 ultimately depends, obviates the rejection, without narrowing the scope of the claims.

11. Claims 11-21

Claims 11-21 were rejected under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness because of an assertedly insufficient antecedent basis in the method of claim 1. In particular, the Examiner questioned whether claims 11-21 further limited, or extended, claim 1. The present amendment obviates the rejection without narrowing the scope of the claims, as detailed below.

12. Claim 21

Applicants request clarification of the Examiner's statement that claim 21 lacks antecedent basis for the step of extracting and submit that this assertion does not provide proper basis for rejecting claim 21 under 35 U.S.C. § 112, second paragraph.

13. Claim 12

With respect to the recitation of "the media" in claim 12, Applicants have amended claim 12 to clarify that "the media" is an aqueous medium for which antecedent basis is found in claim 1. Accordingly, the Applicants submit that this basis for rejecting claim 12 has been rendered moot by the amendment to claim 12.

14. Claim 17

With respect to the recitation of "the solvent solution" in claim 17, Applicants have amended claim 17, thereby providing proper antecedent basis and obviating the rejection, without narrowing the scope of the claim.

15. Claims 11, 15, 16, and 17

Claims 11, 15, 16, and 17 were rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness because of asserted uncertain relationships between limitations drawn to the use of "solvent," "medium," "solvent solution," "agent" and "acetic acid." Applicants have clarified that the recitation of "solvent solution" means "solvent," with the recitation of "solution" being unnecessary in this context. Applicants also submit that the present amendment to claims 11, 15, 16, 17, 18, and 21 obviates the rejection without narrowing the scope of the claims.

16. Claim 22

Claim 22 was rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness because of an assertedly improper Markush group. The Applicants submit that claim 22 as amended recites a proper Markush claim and reflects the correction of typographical errors apparent to one of skill in the art. The amendment to claim 22 obviates the rejection, without narrowing the scope of the claim. Accordingly, the Applicants submit that this basis for rejecting claim 22 has been overcome.

17. Claim 25

Claim 25 was rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness because the Examiner asserted that the term "epicuticular" is an insect exoskeleton material and further extends the claimed invention rather than limits it. The Applicants respectfully disagree.

The meaning of the term "epicuticular material," as recited in pending claim 25, clearly and unambiguously refers to the outer waxy layer of a plant, and this definition would be known to one of skill in the art. Moreover, such a definition is not repugnant to the

definition proffered by the Examiner. Accordingly, the Applicants submit that the term has been given an ordinary and accustomed meaning that is not repugnant to any definition of the term and should therefore be accepted as clearly and unambiguously defining the term in the context of the plant-related invention disclosed and claimed in the instant invention.

The Applicants have enclosed two references discussing epicuticular waxes in plants. (See Appendix C.) Accordingly, the Applicants submit that this basis for rejecting claim 25 has been overcome.

For all of the foregoing reasons, the Applicants submit that the rejection of claims 1-26 under 35 U.S.C. § 112, second paragraph, for asserted indefiniteness has been overcome and may properly be withdrawn.

IV. The Objections to the Specification

The specification was subject to objection for containing empty spaces where some particular information was intended but not incorporated. Office Action at page 2.

The Applicants have amended the specification to correct this matter without introducing new matter and, therefore, the objections to the specification have been overcome and may properly be withdrawn.

V. The Objection to the Claims

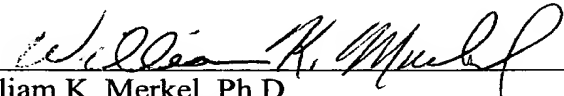
Claim 22 was subject to objection for containing non-italicized Latin plant names and for typographical errors. Office Action at page 2.

The Applicants have amended claim 22 to correct this matter without introducing new matter, and, therefore, the objection to claim 22 has been overcome and may properly be withdrawn.

VI. CONCLUSION

In view of the amendment and remarks made herein, Applicants respectfully submit that claims 1-4 and 6-26 are in condition for allowance and respectfully request expedited notification of same.

Respectfully submitted,
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Atlas Reverse Dictionary Rhyming Dictionary
Dictionary Thesaurus Unabridged Dictionary

One entry found for **allow**.Main Entry: **al·low**

Pronunciation: &- 'lau

Function: *verb*

Etymology: Middle English, from Middle French *alouer* to place,
(from Medieval Latin *allocare*) & *allower* to approve, from Latin
allaudere to extol, from *ad-* + *laudare* to praise -- more at
ALLOCATE

Date: 14th century

transitive senses

1 **a** : to assign as a share or suitable amount (as of time or money)
<allow an hour for lunch> **b** : to reckon as a deduction or an
addition <allow a gallon for leakage>

2 **a** *chiefly Southern & Midland* : to be of the opinion : **THINK** **b**
dialect : **SAY**, **STATE** **c** : to express an opinion -- usually used with
as how or that

3 *chiefly Southern & Midland* : **INTEND**, **PLAN**

4 : **ADMIT**, **CONCEDE** <must *allow* that money causes problems in
marriage>

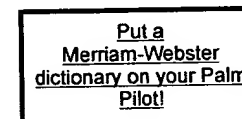
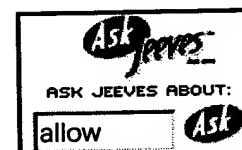
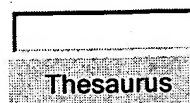
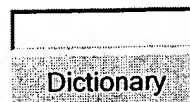
5 **a** : **PERMIT** <doesn't *allow* people to smoke in his home> **b** : to
forbear or neglect to restrain or prevent <*allow* the dog to roam>
intransitive senses

1 : to make a possibility : **ADMIT** -- used with *of* <evidence that
allows of only one conclusion>

2 : to give consideration to circumstances or contingencies -- used
with *for* <*allow* for expansion>

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\&\ as a and u in <u>abut</u>	\e\ as e in <u>bet</u>	\o\ as aw in <u>law</u>
\&\ as e in <u>kitten</u>	\E\ as ea in <u>easy</u>	\oi\ as oy in <u>boy</u>
\&r\ as ur/er in <u>further</u>	\g\ as g in <u>go</u>	\th\ as th in <u>thin</u>
\a\ as a in <u>ash</u>	\i\ as i in <u>hit</u>	\th\ as th in <u>the</u>
\A\ as a in <u>ace</u>	\I\ as i in <u>ice</u>	\ü\ as oo in <u>loot</u>
\ä\ as o in <u>mop</u>	\j\ as j in <u>job</u>	\u\ as oo in <u>foot</u>
\au\ as ou in <u>out</u>	\[ng]\ as ng in <u>sing</u>	\y\ as y in <u>yet</u>
\ch\ as ch in <u>chin</u>	\O\ as o in <u>go</u>	\zh\ as si in <u>vision</u>

For more information see the [Guide To Pronunciation](#).

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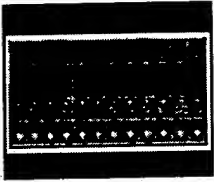
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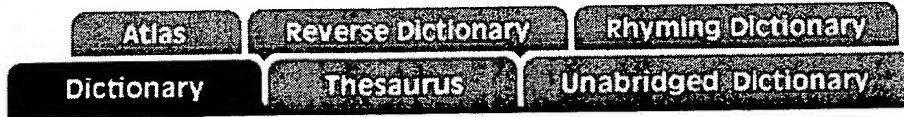
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compound[1,verb]
 compound[2,adjective]
 compound[3,noun]
 compound[4,noun]
 compound-complex
 compound eye

Main Entry: ³**com·pound** ⁴
 Pronunciation: 'kām-"paund
 Function: *noun*
 Date: 1530

1 a : a word consisting of components that are words (as *rowboat*, *high school*, *devil-may-care*) **b** : a word (as *anthropology*, *kilocycle*, *builder*) consisting of any of various combinations of words, combining forms, or affixes
2 : something formed by a union of elements or parts; *especially* : a distinct substance formed by chemical union of two or more ingredients in definite proportion by weight

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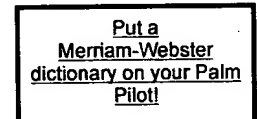
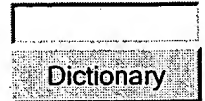
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\&\ as e in <u>kitten</u>	\E\ as ea in <u>easy</u>	\oi\ as oy in <u>boy</u>
\&r\ as ur/er in <u>further</u>	\g\ as g in <u>go</u>	\th\ as th in <u>thin</u>
\a\ as a in <u>ash</u>	\i\ as i in <u>hit</u>	\th\ as th in <u>the</u>
\A\ as a in <u>ace</u>	\I\ as i in <u>ice</u>	\ü\ as oo in <u>loot</u>
\ä\ as o in <u>mop</u>	\j\ as j in <u>job</u>	\u\ as oo in <u>foot</u>
\au\ as ou in <u>out</u>	\[ng]\ as ng in <u>sing</u>	\y\ as y in <u>yet</u>
\ch\ as ch in <u>chin</u>	\O\ as o in <u>go</u>	\zh\ as si in <u>vision</u>

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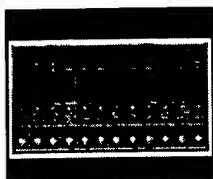
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2 entries found for **component**.
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component[1,noun]
component[2,adjective]

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Main Entry: **¹com·po·nent**

Pronunciation: k&m- 'pO-n&nt, 'k&m-, k&m-'

Function: *noun*

Etymology: Latin *component-*, *componens*, present participle of *componere* to put together -- more at [COMPOUND](#)

Date: 1645

1 : a constituent part : **INGREDIENT**

2 a : any one of the vector terms added to form a vector sum or resultant **b** : a coordinate of a vector; *also* : either member of an ordered pair of numbers

synonym see [ELEMENT](#)

- **com·po·nen·tial** /'k&m-p&- 'nen(t)-sh&l/ *adjective*

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\A\ as a in <u>ace</u>	\I\ as i in <u>ice</u>	\ü\ as oo in <u>loot</u>
\ä\ as o in <u>mop</u>	\j\ as j in <u>job</u>	\u\ as oo in <u>foot</u>
\au\ as ou in <u>out</u>	\[ng]\ as ng in <u>sing</u>	\y\ as y in <u>yet</u>
\ch\ as ch in <u>chin</u>	\O\ as o in <u>go</u>	\zh\ as si in <u>vision</u>

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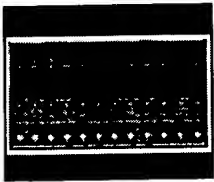
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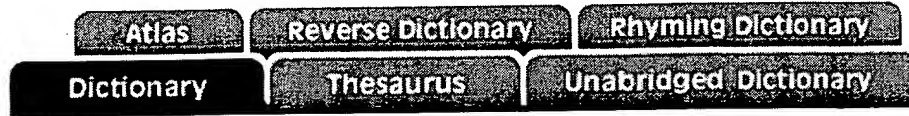


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One entry found for **exude**.

Main Entry: **ex·ude** **u**

Pronunciation: ig-'zūd

Function: *verb*

Inflected Form(s): **ex·ud·ed**; **ex·ud·ing**

Etymology: Latin *exsudare*, from *ex-* + *sudare* to sweat -- more at **SWEAT**

Date: 1574

intransitive senses

1 : to ooze out

2 : to undergo diffusion

transitive senses

1 : to cause to ooze or spread out in all directions

2 : to display conspicuously or abundantly *<exudes charm>*

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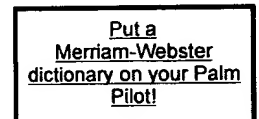
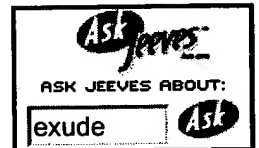
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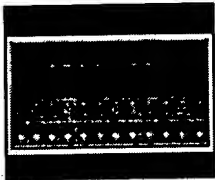
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3 entries found for **extract**.
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extract[1,transitive verb]
extract[2,noun]
ether extract

Go

Main Entry: **¹ex·tract**

Pronunciation: ik-'strakt, oftenest in sense 5 'ek-"

Function: *transitive verb*

Etymology: Middle English, from Latin *extractus*, past participle of *extrahere*, from *ex-* + *trahere* to draw

Date: 15th century

1 **a** : to draw forth (as by research) <extract data> **b** : to pull or take out forcibly <extracted a wisdom tooth> **c** : to obtain by much effort from someone unwilling <extracted a confession>

2 : to withdraw (as a juice or fraction) by physical or chemical process; *also* : to treat with a solvent so as to remove a soluble substance

3 : to separate (a metal) from an ore

4 : to determine (a mathematical root) by calculation

5 : to select (excerpts) and copy out or cite

synonym see **EDUCE**

- **ex·tract·abil·i·ty** /ik-'strak-t&-'bi-l&-tE, (')ek-/ *noun*

- **ex·tract·able** /ik-'strak-t&-b&l, 'ek-/ *adjective*

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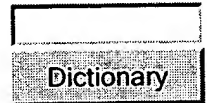
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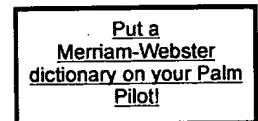
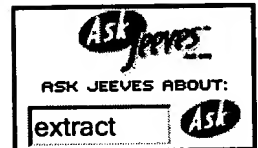


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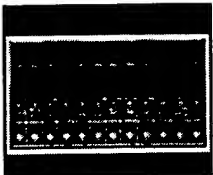
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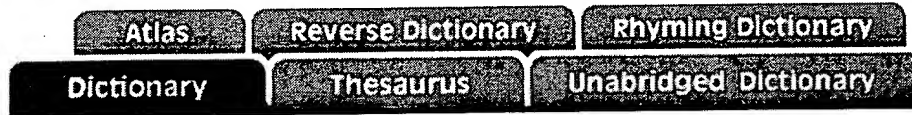
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One entry found for **macerate**.

Main Entry: **mac·er·ate**

Pronunciation: 'ma-s&- 'rAt

Function: *verb*

Inflected Form(s): **-at·ed; -at·ing**

Etymology: Latin *maceratus*, past participle of *macerare* to soften, steep

Date: 1547

transitive senses

1 : to cause to waste away by or as if by excessive fasting

2 : to cause to become soft or separated into constituent elements by or as if by steeping in fluid; *broadly* : **STEEP, SOAK**

intransitive senses : to soften and wear away especially as a result of being wetted or steeped

- **mac·er·a·tion** /'ma-s&- 'rA-sh&n/ *noun*

- **mac·er·a·tor** /'ma-s&- 'rA-t&r/ *noun*

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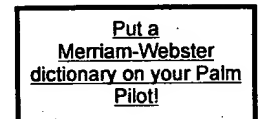
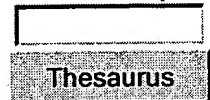
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Plant Biology 2000[Abstract Center](#) . [Session List](#) . **Poster: Vegetative Development****Abs # 135: Epicuticular wax composition, a biochemical marker of vegetative phase change in *Arabidopsis*.****Presenter:** Maier, Camelia G.-A., F_maier@twu.edu**Authors** Maier, Camelia G.-A. (A) Poethig, R. Scott (B) Post-Beittenmiller, Dusty (C)**Affiliations:** (A): Department of Biology, Texas Woman's University

(B): Department of Biology, University of Pennsylvania

(C): Monsanto, St. Louis


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Arabidopsis leaves produced at different stages of shoot growth differ in shape and density and spatial distribution of trichomes on the leaf surfaces. Juvenile leaves lack abaxial trichomes, while adult leaves are highly serrated and produce trichomes on both adaxial and abaxial surfaces. Leaves 1 and 2 are unique in that they are round, lack serrations, and are incompetent to produce abaxial trichomes. Previous studies have shown that juvenile and adult leaves in maize produce different amounts and types of epicuticular waxes (EW), and that this trait is a reliable marker of phase change. Although the composition of EW has been shown to change during vegetative development in *Arabidopsis*, it is unknown whether these changes are correlated with changes in phase-specific traits, such as leaf shape and trichome production. In order to determine if EW is a phase-specific trait in *Arabidopsis*, we studied the EW composition of each rosette leaf in wild type plants and *squint*, a mutant that fails to produce juvenile leaves. The first two leaves of Ler and Col plants had significantly higher levels of total and individual EW aldehydes than leaves at higher nodes, independent of the light treatment. Aldehydes represented 22% of the total wax on the first two leaves of Col plants, compared to 8% for leaf 3, 3% for leaf 5 and 0.5% for leaves 7 to 9. The EW on the first two leaves of the *squint* mutant completely lacked aldehydes, an observation that is consistent with the fact that these leaves resemble adult leaves in shape, size, and trichome production. These results support the hypothesis that wax production is a phase-specific trait in *Arabidopsis* as it is in maize, and is a useful marker for studying the mechanism of vegetative phase change in this species.

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Formation and role of selected plant surface lipids

Working group: *Dr. Reinhard Jetter*

 Information in deutsch

Plant cuticles constitute the interface between most of the above-ground plant parts and the surrounding atmosphere. In this special position the cuticle has to perform diverse physiological and ecological functions. Certain roles can be traced to individual parts and components of plant cuticles.

1. Formation and ecological role of epicuticular wax crystals

All plant cuticles contain waxes, i.e. highly lipophilic compounds that lie both within the cuticular matrix and (as an amorphous film) on its surface. These films render the plant surfaces hydrophobic. They prevent the formation of stable, macroscopic water phases and, hence, the germination of many plant pathogens. Besides, on specialized plant surfaces microscopic wax crystals protrude from the amorphous wax films. The presence of wax crystals causes the glaucous appearance of respective surfaces, renders them perfectly unwettable and causes water droplets to run off and wash pathogens and dirt away. Epicuticular wax crystals thus perform an important protective function [1][2]. In order to fully understand the ecological role of epicuticular wax crystals we want to elucidate the mechanisms of their formation and degradation. These mechanisms are closely related to their chemical composition and physical structure. Chemical analyses will be carried out by means of gas chromatography with flame ionization, infrared, and mass spectrometric detectors [3][4].

The present project is focusing on the physico-chemical characterization of selected crystal types on selected plant systems. As a first objective we decided to study the chemical composition of tubular crystals on conifer needles. Unfortunately, there are no adequate techniques to isolate and/or analyze wax crystals without interference of the surrounding amorphous wax mixtures. Instead, the chemical composition of wax tubules could be inferred indirectly: Extracted waxes (from *Picea pungens*) were separated chromatographically into compound classes. The isolated compounds were then crystallized from organic solutions onto glass and the resulting structures were monitored by scanning electron microscopy. Only the asymmetric secondary alcohol nonacosan-10-ol [5] and its alkanediol derivatives (e.g. nonacosane-4,10-diol, nonacosane-5,10-diol, nonacosane-10,13-diol) were able to form tubular crystals [6]. Their sizes and arrangements were comparable to those on the needles. Both nonacosan-10-ol and its diol derivatives constitute outstandingly high percentages of respective wax extracts. It is therefore now very plausible that tubular crystals on conifer needles consist of these components.

Based on this background models were developed describing the crystal structures of asymmetric secondary alcohols and diols. These models can now be verified experimentally using our techniques for in vitro reconstitution of wax crystals. Respective techniques will further be utilized in:

1. X-ray powder diffraction experiments [7],
2. Fumigation studies with ecologically relevant compounds [8],
3. Crystallization experiments in the presence of other wax components,
4. Crystallization experiments with defined mixtures of secondary alcohol and diols.

In parallel, the chemical composition and the physical structure of other (i.e. non-tubular) crystal types from diverse plant systems will be investigated.

2. Biosynthesis and ecological role of epicuticular triterpenoids

Terpenoids play a crucial role in the interactions of plant hosts with their animal pests and pollinators or fruit dispersers. More than 20,000 terpenoids have been identified in plants but only for selected examples the biosynthetic pathways and the exact ecological roles are known. In general, the volatile mono- and sesquiterpenoids are released by plants as a first line of signalling to target organisms. In many cases the non-volatile di- and triterpenoids are presented on plant surfaces and serve in modifying pest behavior or in sealing wounded tissue [9][10].

Triterpenoids have repeatedly been identified in cuticular wax mixtures and in some instances their role as anti-feedants against insects and vertebrates was discussed. The compositions of cuticular triterpenoid mixtures usually varies widely with the plant species and origins, organs and developmental stages. This finding implies that individual triterpenoids are formed specifically and that they contribute specifically to the ecological functions of the mixture. A better understanding of their functions must therefore be based on detailed knowledge about their biosynthesis and its regulation.

The biosynthesis of triterpenoids proceeds via ubiquitous intermediates such as isopentenylpyrophosphate and farnesylpyrophosphate and the last aliphatic precursor squalene. The central step in triterpenoid biosynthesis is the cyclization of this compound (or its epoxide) to yield alternatively:

1. Lanosterol (->steroid biosynthesis in animals and fungi),
2. Cycloartenol (->steroid biosynthesis in plants),
3. Hopanoids (bacteria)
4. Triterpenols (plants).

In this cyclization the carbon backbone of the product is stereospecifically formed making this the committed step in the pathway [10]. The competing formation of different products and product classes will therefore be under tight biochemical control in order to generate the specific triterpenoid mixture found in respective plant waxes. This control can be exerted genetically and on the protein level and therefore both the DNA sequence information and the kinetic characteristics of the involved enzymes are of interest. For a detailed understanding of the mechanisms of this regulation we need a broad genetic and enzymatic database of triterpenoid synthases from various plant sources. To date, from plant tissues only amyrin synthases and cycloartenol synthases (from *Pisum sativum* and *Rabdosia japonica*) have been isolated. The Arabidopsis gene coding for cycloartenol synthase has been cloned.

In this project triterpenoid synthases will be isolated and purified from various plant systems and characterized kinetically. For this purpose modern chromatographic techniques for protein separation in the low and medium pressure range are available. Radiolabeled squalene epoxide will be synthesized and used in assays for mechanistic studies of the purified enzyme(s). Finally, a PCR-based approach will be used to obtain the sequence information for homologous gene products from selected plant systems

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